


GOVERNMENT OF THE DISTRICT OF COLUMBIA


District Department of the Environment

Air Quality Division



CHAPTER 2 TECHNICAL MEMORANDUM

TO: Stephen S. Ours, P.E. 
Chief, Permitting Branch

FROM: John C. Nwoke 
Engineer

SUBJECT: **Pepco Energy Services, Inc.
Blue Plains –Advanced Wastewater Treatment Plant
Permit Nos. 6809 and 6810
Permits to Construct and Operate MPT Temporary Boiler**

DATE: November 15, 2013

BACKGROUND INFORMATION

On August 13, 2010 the District of Columbia Water and Sewer Authority (DC Water) submitted an air permit application for a Main Process Train, Combined Heat and Power Plant, and Final Dewatering Facility. Following several meetings and consultations with DC Water, a Supplemental application filing was submitted March 8, 2011.

The different components of the biosolids handling components are functionally related and inter-dependent. An example of this is the dependence of the Main Process Train (MPT) on steam supply from the auxiliary boiler and a temporary boiler. The temporary boiler is needed to provide steam to the MPT during the shakedown period of the CHP – the first 180 days of the start-up of operation. Although the biosolids handling project includes a permitted permanent auxiliary boiler, this boiler is not designed to provide optimum performance that meets the thermal demand from the anaerobic digestion portion of the project. More specifically, the auxiliary boiler does not operate satisfactorily at lower loads, thereby resulting in emissions that would not comply with the requirements of Permit #6372-A1. Hence a separate temporary boiler is needed to provide steam to the MPT during the start-up when the steam demand is low. When the steam demand increases to the operating range of the permanent Auxiliary boiler, the latter would be brought into services, and the use of the temporary boiler would cease.

Thus the idea of a temporary boiler permit is to provide permitting coverage for that first 180 days of shake down operation of the CHP. At the end of the shakedown period, the CHP will be able to produce steam of sufficient capacity to operate the MPT for further production of digester gas of the highest quality for an enhanced CHP performance.



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However, because of the temporary nature of the boiler, it is more expedient to permit the temporary boiler under a separate cover, although its emissions were considered in the New Source Review (NSR) evaluation of the entire air permit application filings.

Processing of draft Permit #6483 was started in response to the application filing of March 8, 2011 for a temporary 64.3 million Btu per hour natural gas boiler. But at the request of DC Water, processing of the permit was suspended and subsequently a new application was filed on October 21, 2013 by Pepco Energy Services Inc. (PES) in place of that previously submitted application, but for the same reasons stated earlier. The application filing is for the construction and operation of two (2) 9.9 million Btu per hour Cleaver Brooks natural gas-fired temporary boilers. This set of applications effectively replaces the application submitted on March 8, 2011 and related draft Permit No. 6483 which was never fully processed nor issued.

PES states that the potential to emit (PTE) for nitrogen oxides of the two temporary boilers is not only below the major source threshold, but the performance of the two Cleaver Brooks boilers are also below the emissions predicted for nitrogen oxide for the single 64.3 million Btu per hour temporary boiler included in Permit No. 6372-A1 to Construct New Biosolids Handling Facilities for DC Water.

PES has not requested that any portions of the applications be held confidential

TECHNICAL INFORMATION

1. Main Process Train: Where the biosolids undergo biochemical transformation through a thermal hydrolysis process (THP) prior to anaerobic digestion of the hydrolyzed biosolids. The MPT will require steam needed for the THP. Auxiliary boilers, duct burners, a temporary boiler will also be needed as part of the MPT process. However, the temporary boilers are being permitted under a separate application process due to the temporary nature of the usage (For 6 months only). The MPT will produce digester gas and odorous sulfur compounds that must pass through scrubber system for proper cleaning. The digester gas is used to power the Combined Heat and Power Plant.

2. Combined Heat and Power Plant: Where power is produced through the use of digester gas. Gas turbines (4) use the digester gas and to a lesser extent natural gas to produce 13 MW of in-facility electricity when running at maximum capacity. Equipment associated with this segment of the project include black-start emergency generator, emergency flares, a flare for destruction of Siloxane gas prior to feeding the digester gas to the auxiliary boiler or gas turbine or duct burners.

3. Final Dewatering Facility: Here is where the post hydrolyzed and digested biosolids undergo final dewatering process through belt-filtering process which results in a Class A biosolids suitable for agricultural use. Scrubbers associated with odor removal include an existing DSLF scrubber being permitted under a different application due to logistics, a new odor DSLF

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scrubber for the final dewatering facility (also being permitted under a separate cover at the request of DC Water for contractual timeliness).

The BHF is a complex project involving many projects in one, and requiring design build, design bid build, and design-build-operate types of contracts. The Department ensured that all equipment specifications in the application would meet all required regulatory standards and that the shop drawings and vendor information would be consistent with at least 70% of the As-Built configuration and design. On-going communications and updates were received from DC Water throughout the development of the permit-to-construct other related equipment.

Emissions Evaluation

During a start-up period projected for the duration of six to nine months after initial operation of portions of the equipment, natural gas will be the primary fuel, with supplemental digester gas as available.

As noted earlier, the use of two small boilers leads to lower emissions compared to a single large boiler originally planned for use on the project, as the table shows.

Table 1 – Start-Up Emissions for One Temporary Boiler

Pollutant	Temporary Steam Boiler Emission Limits	
	One (1) 64.3 MMBtu/hr(lbs/hr)	Two (2) 9.9 MMBtu/hr (lbs/hr)
PM (Total) ¹	0.48	0.20
SO _x	0.038	0.04
NO _x	2.44	2.00
VOC	0.35	0.10
CO	9.71	0.71
PM ₁₀	0.48	0.20
PM _{2.5}	0.48	0.20

⁽¹⁾ Total PM is the sum of the filterable PM and condensable PM.

REGULATORY REVIEW

Chapter 2, Section 200: General Permit Requirements

The provisions of this section are applicable to the temporary boilers as they are stationary sources of air pollution. A permit is therefore required to operate each boiler pursuant to 20 DCMR 200.1 and 200.2. The permit will be valid for one year.

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Chapter 2, Section 204: Permit Requirements for Sources Affecting Non-Attainment Areas

The review of the Chapter 2 permit application for the biosolids handling facility of which the temporary boilers are a part, indicated that the facility would exceed 25 tons per year of Nitrogen Oxides (NOx).

The major source threshold for the DC-MD-VA nonattainment area for NOx is 25 tons per year. The proposed project will generate emissions increases over the major source threshold, under the existing 20 DCMR 204 provision and therefore will trigger NNSR analysis. This analysis was completed for the biosolids project as a whole, including the originally proposed larger temporary boiler. Therefore a separate analysis is not required for the smaller temporary boilers now proposed.

Pursuant to 40 CFR 51.165, the permitting process included a complete NNSR review and a requirement that DC Water secure NOx offset in accordance with federal NNSR requirements and 20 DCMR 204.2. DC Water secured a NOx offset of 129.93 tons of NOx per year from the State of Maryland. The emission credits met all federal requirements.

DC Water presented a LAER proposal for consideration. The LAER proposal covered the temporary boiler, auxiliary boilers, and other equipment. The LAER were accepted because in each instance the underlying technology for the operation of the fuel-burning equipment met or exceeded the highest standard that is protective of the environment and resulted in reduced emissions of NOx. With regard to offset acquisition, the Department worked in cooperation with the US EPA and the State of Maryland to ensure that the NOx offset met all federal requirements.

PSD– The project will have a PTE of less than 250 tpy for all pollutants, and so this is not subject to PSD. However, under the Greenhouse Gas Tailoring Rule, PSD applicability was considered due to a segment of the rule affecting biogenic sources of CO2. In this case the project will generate more than 100,000 tpy of CO2 equivalent and therefore will be subject to this rule, if the portion of 40 CFR Part 98 that is applicable to biogenic sources is in effect today.

Although the District is not a delegated state for PSD, the District is coordinating efforts with the EPA to address any PSD issues that might arise when the moratorium on applicability placed by the EPA is lifted.

The Greenhouse Gas Monitoring and Reporting Rule:

40 CFR 98 has requirements for monitoring and reporting of greenhouse gas such as CO2, methane and nitrous oxide, if certain thresholds are exceeded. Additionally, combustion sources like boilers and gas turbines must report GHG emissions, if they emit 25,000 metric tons (tonnes) or more.

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The CHP combustion sources are subject to 40 CFR 98 part C reporting requirements. Emergency generators are excluded from this requirement under 98.30(b). Flaring is also not subject to this rule. Pursuant to 40 CFR 98.6 and 98.2(b)(2), only CH₄ and N₂O from digester gas are to be reported as carbon dioxide equivalent, and not CO₂ per se. When burning natural gas, carbon dioxide equivalent of 63291 tonnes (metric ton) will be generated by the gas turbine, and this exceeds the threshold of 25,000 tonnes, thus the facility will report the emission when on burning natural gas. When all the CHP equipment are fully operational, an estimated 18,960 tonnes of CO₂eq will be emitted. When the total natural gas combustion of the facility is considered, an estimated DC Water-wide CO₂ equivalent of 66,766 tonnes will be generated, thus subjecting the facility to the requirement of 40 CFR 98.

Chapter 2, Section 205: New Source Performance Standards

Subsection 205.1 of 20 DCMR adopts the federal New Source Performance Standards (NSPS) under 40 CFR Part 60.

40 CFR 60 Subpart Dc does not apply to the temporary boilers because each boiler is less than 10 million BTU per hour of heat input, which is below the threshold of applicability.

Chapter 3: Operating Permits and Acid Rain Programs

The project is not subject to the Acid Rain Program.

The permits are not being issued to DC Water, but the equipment would be considered a "support facility" under Chapter 3 (Title V) permitting requirements. However, since the equipment will be removed less than a year after Chapter 3 permitting requirements become applicable, there is no need for the equipment to obtain a Title V permit.

Chapter 6: Particulates

The temporary boilers could emit visible emissions during any period of equipment startup, operation or shutdown and as such 20 DCMR 606.1 is applicable. All aspects of 20 DCMR 606 are reflected in the permit.

Additionally, the particulate matter emission limit from fuel burning equipment specified in 20 DCMR 600 is found in Condition II(b). It is expected that this requirement will be easily met by ensuring that the equipment burns only natural gas as required by the permits. If there is any reason to suspect that this limit is not being met, emission testing may be required under Conditions IV(a) and (d).

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Chapter 8: Asbestos, Sulfur, Nitrogen Oxides, and Lead

The provision of 20 DCMR 801.1 with respect to sulfur content of fuel oils is not applicable since the equipment is limited to burning only natural gas.

Chapter 9, Section 903: Odorous or Other Nuisance Air Pollutants

The temporary boilers could emit emissions such as soot during any period of equipment startup, operation or shutdown and as such 20 DCMR 903.1 is applicable. Permit condition II(d) limits the extent of PM or odorous emissions from operating the boilers.

Other Regulations

Subpart JJJJJ of 40 CFR 63 – The “National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources” regulates Hazardous Air Pollutants (HAPs) such as acetaldehyde, acrolein, benzene, toluene, xylene, cadmium, chromium, lead, etc, through surrogate compounds such as formaldehyde, Carbon Monoxide (CO) and/or Volatile Organic Compounds (VOC).

A facility that emits or has the potential to emit 10 tons/year of any single HAP or 25 tons/year of any combination of HAPs, is consider a Major Source. Any source that is not a Major Source is an Area Source. This facility is not a major source of HAPs. Because the boilers are temporary and burn only natural gas the area source boiler rule does not apply to the temporary boilers pursuant to 40 CFR 63.11195.

Subpart DDDDD of 40 CFR 63 for ICI Boilers and Process Heaters was reviewed and was found inapplicable as it pertains to major sources of HAPs.

Testing, Monitoring and Record Keeping Requirements:

Testing, monitoring and record keeping requirements pursuant to 20 DCMR 500.8 and 502 have been included in the permit document under Permit Conditions IV and (V).

RECOMMENDATIONS

The draft permit is scheduled for posting in the D.C. Register on November 22, 2013 for a thirty-day public comment period.

The proposed project and attached permit document comply with all applicable federal and District air pollution control laws and regulations. I recommend that the attached permit document be issued if there are no comments received following the completion of the public review period.

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